FAUNAL REMAINS FROM THE SCHOENBRUNN VILLAGE, TUSCARAWAS COUNTY, OHIO

James L. Murphy

ABSTRACT. Goerhing and Snyder (2003) provide an overview of the Ohio Historical Society's archaeological work at the Moravian missionary village of Schoenbrunn, including an analysis of the faunal remains, and illustrate some of the problems inherent in dealing with material recovered from at least three separate episodes of excavation and curated somewhat haphazardly in the intervening years. In 1983, I examined the faunal material excavated at Schoenbrunn, including some or all of that excavated by Mills, some simply labeled "Found at Schoenbrunn" but believed to have been excavated by Mills, and some excavated by Raymond S. Baby in 1950. While not abundant, the faunal material recovered by Baby is useful because some provenience information is available and can be used to relate the faunal material to historic artifacts and features at the site. On the other hand, prehistoric artifacts also occur throughout the site, or at least throughout the curated collection, so that it is possible that the faunal sample is of mixed temporal provenience. Differences in species identification and quantitative data between the two analyses appear to be due to a variety of factors, including degradation of the collection over time.

Given the exigencies of time and available expertise, archaeological faunal collections are rarely re-analyzed. In 1983, I studied a faunal sample excavated at the Historic Moravian settlement of Schoenbrunn, Tuscarawas County, Ohio, but did not publish my findings. Goerhing and Snyder (2003) have published a faunal list compiled by Anne B. Lee based on an analysis of the same collections. Discrepancies between the two lists led to a reexamination of the material and raised significant questions about both the integrity of the collection and previous identifications of various taxa.

EXCAVATION HISTORY

In 1923, William C. Mills conducted excavations to determine the location of the site, preparatory to purchasing it with $10,000 appropriated by the Ohio General Assembly. According to a newspaper article in the *Ohio State Journal* (July 12, 1923), Mills found enough evidence to establish that the village of Schoenbrunn was located on the 24 acres owned by Emmett A. Meyers. Specifically, in the "shallow cellars of the 60 log dwellings" Mills found fragments of "brightly colored glass resembling Venetian glass" as well as fragments of clasp knives, "large sherds of beaten copper," flintlocks, tomahawks, wrought iron nails, fragments of human bones, and pottery ware. This is the most complete published account I have located of the 1923 excavations, for none was ever published by the Ohio Historical Society. Goerhing and Snyder (2003:31) mention Mills' excavation of the Historic cemetery in 1927 and an "additional study" in 1930 but do not document either. There is a small faunal sample labeled "Fourth lot from east end of street on north side of street" excavated March 14, 1930, but no significant amounts of faunal material appear to have been recovered from this activity. Associated with Baby's 1950 excavation is a collection of field notes referring to various trenches and features and an accession list relating his 57 "Bd" numbers to various excavation units and features, but no one at the Ohio Historical Society now seems to know the significance of his term "Bd." The only published accounts of Baby's work are several brief news notes (Anonymous 1950; 1950a; 1952; Baby 1950).

THE PROBLEM OF TEMPORAL PROVENIENCE AND ARCHAEOLOGICAL INTEGRITY

In large part because of the great uncertainty regarding temporal provenience of the extant material examined from Schoenbrunn, the results of my study were never submitted for publication. (Three ball clay tobacco pipe fragments are the only artifacts from this material previously described in print [Murphy 1986]. These were not noted in re-study of the Schoenbrunn collection.) Publication on the faunal material was deferred because of the confusion and lack of detail in provenience and particularly because of the presence of prehistoric lithic material in many of the excavation units, suggesting that the faunal remains may not be derived entirely from the Historic era occupation at Schoenbrunn. Lee (in Goerhing and Snyder 2003:40) makes this same point but by no means stresses it: "...since it seems likely that at least some of the elements are from earlier prehistoric occupations, it is possible that there was a

James L. Murphy Professor Emeritus Ohio State University Libraries 1858 Neil Avenue Columbus, Ohio 43210 e-mail: <murphy.11@osu.edu>

substantial village occupation present here, particularly during the Late Woodland Period." Actually, as many "typeable" artifacts in the collection are from the Archaic Period as from the Late Woodland (Goerhing and Snyder 2003:Table 3), and cursory examination of the ceramics suggests Early rather than Late Woodland to me. Recognition of a putative "substantial village occupation" during the Late Woodland does not seem particularly justified by the existing evidence or especially helpful in interpreting the faunal remains. The most compelling evidence that the bulk of the faunal material is "late" or Historic is the generally good state of preservation of the elements and the dearth of similar material found in earlier (Archaic and Early Woodland) components excavated from open sites in Ohio; but this is a highly subjective criterion. Goehring and Snyder (ibid.:42) show admirable caution in recognizing that "none of the proveniences can be positively shown to contain sealed deposits restricted to the Schoenbrunn occupation" and in documenting the presence of both earlier and later components, concluding that "Schoenbrunn must be interpreted as only one of many occupations at this location, possibly including at least one from the mid-19th century." Underscoring this stricture is the fact that the two sherds of "Brown glaze, crockery" listed by Goehring and Snyder have been found to represent an Albany slip-decorated molded form with divided basal ring and are almost certainly 20th century in age.

Most unfortunately, the largest assemblage of faunal material comes from Baby's Feature 4, which contained at least one gunflint but also at least one Adena point and what I in 1983 characterized as "Adena pottery." If we disallow those assemblages containing prehistoric items, both prehistoric and Historic artifact material, and those with no artifact material (on the theory that those containing no artifact material could belong to any one or more of the temporal components), there is very little faunal material that can be assigned to purely Historic features, and these are chiefly from Mills' excavations (his Excavation #17, Ashes of Nathaniel Davis home, Turtle Shell from Ashes of Indian Home, and Fireplace of Church). To these, we might add the contents of those features yielding remains of domesticated animals, though even here the issue of temporal provenience becomes difficult to interpret. This yields a sample so small that quantitative data are of little or no significance in any faunal analysis, so that we are left with simple presence/absence of species.

THE PROBLEM OF CURATION

An additional problem is the apparent degradation of the collections since their initial excavation. Remarkably, in reconstructing the provenience units of the existing collection Goehring and Snyder (2003:33-34) found no material labeled with 21 of Baby's 57 Bd units and one unattached label. This is not to say that all of this material has been lost, but the clay pipe fragments from Mills' 1923 excavation and Baby's 1950 excavation (Bd 12) described by Murphy (1986) were not found in the recent re-study; nor were the nine gunflints (Bd 17) noted by either Goehring and Snyder or the present author. While it has been suggested that some of this material may be on display, this surely does not explain the considerable difference in the total number of faunal elements recorded by me and by Lee, nor the current absence of unique or nearly-unique elements and species identifications tabulated in 1983.

Species which were identified in 1983 but are not listed in the 2003 report by Lee include elk, bison, muskrat, grouse, softshell turtle, *Aplodinotus*, and several naiad species (**Table 1**). Ideally, in re-examining the collection I hoped simply to locate the elements about which there was apparent disagreement and determine the correct identity. This did not always prove possible and it seems evident that in 1983 I saw some material that was not later available to Lee. Some of the collection remains in what appear to be the original paper bags used by Mills and by Baby but much has clearly been "re-packaged" since the 1983 study. As a result, it is not always possible to reconcile the curational units examined by Lee and those earlier examined by me. Although Goehring and Snyder provide detailed provenience for the artifact material based on the available labels, this was not done with the faunal material; however, Lee's more detailed inventory is available at the repository and has been made available through the courtesy of Martha Otto and David Snyder.

Lee enumerates 1486 faunal elements, compared to the 1806 elements and fragments that I tallied. The fact that I did not repair mends, although obvious matches were taken into account, while Lee did perform cross-mends, may be a factor in this numerical discrepancy but is probably not a significant one. Much of this discrepancy seems to be due to several Schoenbrunn assemblages that I viewed in 1983 but which were not apparently available to her, for whatever reason, and were not recognized in my re-examination of the collection.

There are a number of differences in the taxa identified by me and those in Lee's study, some significant enough to have prompted the reexamination of the material. As noted, not all of these discrepancies appear to be due to misidentifications, as several elements identified in 1983 cannot now be found and very likely were not available to Lee. The re-bagging of much of the material at some point after 1983 has resulted in additional confusion; material from Mills Excavation #18, April 23, 1923, for example, is now labeled "Box 6, Bag 1," although it can be identified by virtue of its unique faunal composition, being the only sample common to both Lee's analysis and mine that contains three right raccoon mandibles. Other samples

Table 1. Inventories of Schoenbrunn faunal materials.

Scientific Name	Lee 2003	1983/2004 MNI	Mills 1923	1950 Feature 4	1950 Feature 5	1950 Other	1983 Total
Anguispira alternata	1	1/1	--	1	--	--	1
Naiads	2	--	5	1	--	--	6
Cyclonaias tuberculata	1	2/1	2	--	--	--	2
Ligumia recta	2	3/1	4	--	1	--	5
Amblema plicata	3	2/1	3	--	--	--	3
Obovaria sp.	--	1/0	--	1	--	--	1
Pleurobema clava	--	1/0	--	1	--	--	1
Elliptio dilatatus	--	1/0	1	--	--	--	1
Lasmigona costata	--	1/0	1	--	--	--	1
Osteichthyes	88	--	2	97	--	2	101
Moxostoma carinatum	13	1/1	--	9	--	--	9
Ictalurus punctatus	2	1/1	1	--	--	--	1
Aplodinotus grunniens	--	1/0	--	1	--	--	1
Testudines	3	--	--	2	--	--	2
Terrapene carolina	3	1/1	6	--	1	--	7
Trionyx spinifera	--	1/0	3	--	--	--	3
Chrysemys picta	1	1/1	1	--	--	--	1
Aves	85	--	28	52	--	--	80
Meleagris gallopavo	4	2/1	10	6	--	1	17
Gallus gallus	1	2/1	1	--	--	--	1
Anas sp.	1	1/1	1	--	--	--	1
Bonasa virginianus	--	1/0	3	--	--	--	3
Mammalia	955	--	276	731	76	29	1112
Castor canadensis	--	1/0	--	1	--	--	1
Ondatra zibethecus	--	1/0	3	--	--	--	3
Ursus americanus	24	1/1	9	12	--	--	21
Procyon lotor	9	4/4	8	2	--	--	10
Sus scrofa	11	2/2	17	5	--	1	23
Cervidae	69	--	--	--	--	--	--
Odocoileus virginianus	206	10/7	204	126	38	8	376
Cervus elaphus	--	1/0	9	--	--	--	9
Bos taurus	2	1/1	2	--	--	--	2
Bison bison	--	1/0	--	1	--	--	1
Total	1486	46/ 26	600	1049	116	41	1806

which were available to me but cannot be discerned in Lee's enumeration or in the present collection include "Turtle Shell from Ashes of Indian Home" (1 element), "Schoenbrunn Elk Bones" (3 elements), "Excavation #7" (8 elements), "Animal Bones" [with TD pipe fragment] (139 elements), and "Found at Schoenbrunn" (190 elements). While not a huge amount of material it does contain significant elements unreported by Lee, as discussed below. These assemblages are all from the Mills excavations but Baby's original accession list for the Schoenbrunn material lists 1038 faunal elements from his Feature 4. In 1983 I tabulated 1049 elements, while Lee lists only 911, suggesting a substantial amount of material may not have been available to her. Whether this is due to actual degradation of the collection, cross-mending, or some other factor has not been determined. Goehring and Snyder (2003:31) seem aware of this problem, for they note that "a systematic effort is being made to identify extant collections although it cannot be ruled out that there may be other collections or artifacts that have not yet been identified either at OHS, at another facility, or in private hands."

With the exceptions noted in the previous paragraph, most of the collection units examined by me in 1983 can be recognized in Lee's detailed inventory, with only relatively

minor discrepancies in identifications and numbers of elements. It is evident that there has been some mixing at some point. For example, the unique fragment of *Chrysemys* plastron and the unique *Ursus* terminal phalanx or claw were both found in the same assemblage from Baby's Feature IV Trench 4 in 1983 but are now in different collection assemblages, although still identified as being from Feature 4.

Lee's summary of Schoenbrunn faunal remains is reproduced in Table 1, including additional columns for species I encountered that she does not list as well as totals of number of elements and minimum numbers of individuals for the two analyses. Species which I have identified but which are not included in her study are bold-faced. Note that Lee divided unidentified mammalian elements into size grades, which I did not do, and I have combined her size grades in the present redaction of her table. Also, I have presented separate tabulations for Baby's Features IV, V, and the remainder of Baby's material.

UNIDENTIFIED, MISIDENTIFIED, AND MISSING ELEMENTS

Comparison of my 1983 identifications with those of Lee (in Goerhing and Snyder 2003) initially prompted reexamination of portions of the Schoenbrunn sample. During this study, the "re-curation" of at least part of the collection was recognized, as well as the absence of both faunal and artifact material seen in 1983. No attempt has been made to re-analyze the entire collection.

Elk. In 1983, there was an envelope labeled "Schoenbrunn Elk Bones," which contained a shed antler base, a large pelvis fragment with cut marks just below the acetabulum and a right deer astragalus. Neither Lee nor Goehring and Snyder record such a "provenience unit," although it is possible the antler specimen is now included among one of several "cervid antler beam fragments" recorded by Lee. Distinguishing deer and elk antler fragments is often problematic, and without the original specimens this identification cannot be re-assessed. The same must be said for the identification of the pelvis fragment, large size probably being the distinguishing feature used. After nearly 25 years I have no recollection of the specimen. It is noteworthy that Mills' himself was something of a faunal specialist, although the original identification of this material, assuming it was done by Mills, is rendered somewhat dubious by the inclusion of what was undoubtedly a deer astragalus. This ambiguity does not affect the MNI count.

There is much less doubt about the identity of two lower left molars still preserved in the collection (Mills' Excavation #18, now Box 6, Bag 1) and identified by Lee as *Bos*. These teeth (**Figures 1-3**) clearly represent a cervid rather than a bovid, and size dictates identification as elk. Given the degree of wear, second and third molars of *Bos* would exhibit a distinctive auxiliary buccal stylid or column that is only slight developed in cervids. Additionally, the

Figure 1. *Cervus elaphus* left lower 2nd molar previously identified as *Bos*. Mills Excavation #18 (now Box 6, Bag 1).

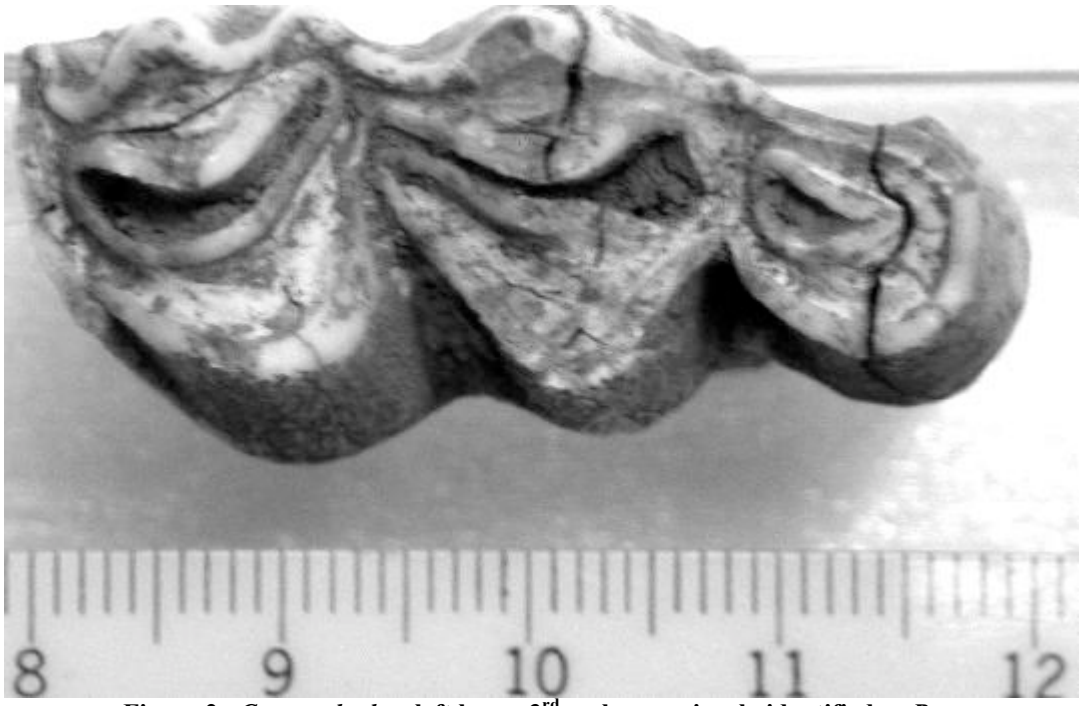

Figure 2. *Cervus elaphus* left lower 3rd molar previously identified as *Bos*. Mills Excavation #18 (now Box 6, Bag 1).

Figure 3. Buccal view of *Cervus elaphus* 3rd and 2nd molars shown in Figures 1 and 2.

third molar in *Bos* has a small, "extra" but quite distinct posterior loop or lobe absent from the Schoenbrunn specimen. Finally, the buccal outlines of the worn interior dental loops are distinctly sinusoidal or concave in *Bos* whereas they remain convex in elk.

Bos. Although the left mandibular 2nd and 3rd molars from Box 6, Bag 1, which Lee misidentified as *Bos*, are clearly elk, I did record a *Bos* molar and lower incisor from a group of bones labeled "Found at Schoenbrunn." These have not been found in the present collection, however, nor do Lee or Goehring and Snyder recognize this label, "Found at

Figure 4. Immature *Bison* horn core excavated by Raymond S. Baby and shown *in situ* in his Feature 4, Trench IV, 1960 (photo courtesy of The Ohio Historical Society).

Figure 5. *Bison* horn core excavated by Raymond S. Baby.

Schoenbrunn." Absent the specimens, this identification cannot be confirmed, since *Bison* is also known from the site, but I am inclined to accept it, sustained in the belief that at the time of analysis I would have taken pains to distinguish the two taxa.

Bison. In 1950, Baby excavated a small bison horn core, which is shown *in situ* in **Figure 4**. It was found in his excavation unit "Bd26," which represents his Feature IV, Trench 4. **Figures 5 and 6** were taken in 1983 but the specimen was not seen by me in 2006 nor apparently by Lee. In 1967 Baby had the identification confirmed by John

Figure 6. *Bison* horn core excavated by Raymond S. Baby.

Guilday, who in a letter to Dr. Donald Heintzelman of the William Penn Memorial Museum, wrote "The *Bison* from the Schoenbrunn site is just that. A right horn core, probably a female buffalo. The basal circumference of the horn core is 24 cm. which equals that of the largest of twenty horn cores of domestic cattle form historic Fort Ligonier. But the shape is characteristically *Bison*. (Guilday to Hentzelman, 8 February 8 1968)." Dr. Jerry McDonald has also examined the specimen and confirmed the identification (McDonald to author, e-mail, December 15, 2006).

The presence of a relatively small *Bison* at Schoenbrunn is particularly interesting in view of an historic reference called to my attention by Jeff Carskadden. As the Moravians began their long march from the Tuscarawas Valley into exile in September, 1781, Heckewelder (1820: 385) notes:

> Arriving at Gnadenhutten – forks of the Muskingum on the third day, a halt was ordered for the purpose of hunting a tamed Buffeloe Cow, that had belonged to one of the party and which was supposed to be in the Woods feeding with other tame horn Cattle; when, scarcely had the hunters been out a quarter of an hour, the Buffeloe, which had come to the opposite side of the River to drink, was shot, and the Meat divided among the whole, we also receiving a share.

Grouse. In 1983, I identified a *Bonasa* scapula in the now missing "Found at Schoenbrunn" collection, another in the missing "Excavation #7" unit, and a *Bonasa* coracoid in the missing TD pipe "Animal Bones" unit. The inability to re-examine these three specimens is especially frustrating, as the possibility that they actually represented domestic chicken cannot be entirely ruled out, especially since a *Gallus* humerus occurs in the extant Box 6 Bag 10, "Excavation #17."

Turtles. Lee uses the terms Testudinae and Testudinidae for what are apparently fragments of turtle shell unidentifiable to genus and species. This is somewhat misleading since the Family Testudinae or Testudinidae, is that of the true tortoises, and the turtles found in Ohio are members of other families such as the Emydidae, Trionychidae, Kinosteridae, and Chelydridae, all of which, including the Testudinae, are members of the Order Testudines.

Soft-shell Turtle. *Trionyx* plastron fragments are readily identifiable, due in part to a distinctly tuberculated surface. In addition, in 1983 I was aided by finding such a fragment in an envelope labeled "Turtle shell from ashes of Indian Home 1." Lee did not report this provenience or this species from Schoenbrunn, and I found neither the plastron fragment nor the envelope in 2006. I also recorded a *Trionyx* plastron fragment in a group of elements simply labeled "Animal Bones," and a third in a group simply labeled "Found at Schoenbrunn." The contents of Box 6, Bag 9, as currently curated are also labeled "Found at Schoenbrunn," but the composition of this 30-piece collection is not identifiable with that of the 190-piece

"Found at Schoenbrunn" collection examined in 1983. While none of the three *Trionyx* plastron fragments recognized in 1983 now seem to be available, the remains are so distinctive that I think my identification can stand.

Bear. "Ashes of Nathaniel Davis Home" yielded a left mandible and two metacarpals. Lee and I both recorded a right mandible from Excavation 18 (Box 6, Bag 1) but it is noteworthy that this element appears to fit the Nathaniel Davis left mandible.

Beaver. I identified a fragment of a left beaver tibia from Baby's Feature IV Trench 4. Lee does not mention this, and I do not find it in the existing collection. I also identified a right raccoon ulna which is not now found in this unit.

Catfish. Lee reports no fish remains from any of the excavation units that can be attributed to Mills. In 1983, however, I examined a small sample simply labeled "Animal Bones," that contained a fragment of a "TD" ball clay pipe (Murphy 1986), as well as 139 faunal elements. Among these were an unidentified fish bone and an *Ictalurus punctastus* left cleithrum. This is not the "Animal Bone" sample extant from Baby's Feature 4, Trench 4, which Lee did examine, and the sample is presumed lost or misplaced. It is curious that Lee does list two isolated *Ictalurus* cleithrum fragments from "Bag 16," and it is possible that one of these represents the specimen I identified.

Moxostoma. Lee identified 12 elements from Baby's Feature 4, Trench 4 as *Moxostoma aureolum*, presumably on the basis of Olsen (1968). Whatever the authority, the Schoenbrunn material does not represent *M. aureolum*, which is now known as *M. macrolepidotum*. The species living in the Tuscarawas would be *M. macrolepidotum macrolepidotum*, the Ohio Shorthead Redhorse. Dr. Ted Cavender, however, has kindly examined photographs of several of these elements, including the hyomandibular and maxilla, and is confident that they represent *M. carinatum*, the River Redhorse. He has also confirmed my identification of a left maxilla of *Aplodinotdus grunniens* included in Lee's *Moxostoma* material.

MODIFIED ANIMAL BONE

Both Lee and Murphy note numerous examples of butchering marks and scavenger gnaw marks (both canid and rodent). Some antler fragments also exhibited modification and presumably represent unfinished tools. The most intriguing modified bone item is a whittled or "shaved" median deer phalanx (misidentified as a terminal phalanx by Lee) recovered by Baby from his Feature 5 and shown in **Figures 7 and 8**. The "shaving" has created a distal taper that makes the element resemble in outline a terminal phalanx. This object may be an unfinished arrow point.

CONCLUSIONS

Given the state of the extant collections and documentation, the Schoenbrunn material is inadequate to permit much in the way of interpretation. Allowing for the likelihood of mixed provenience, it still seems very likely

Figure 7. Worked medial *Odocoileus* phalanx from Baby's Feature 5, lateral view.

Figure 8. Worked medial *Odocoileus* phalanx from Baby's Feature 5, proximal view.

that the Moravian settlements at Schoenbrunn and nearby towns relied heavily upon the native fauna. Given the extent of previous disturbance of the Schoenbrunn site by Mills (particularly if he did excavate all of the "shallow cellars of the 60 log dwellings"), Baby, and possibly others, it is questionable whether the goals desired by Goehring and Snyder (2003:45) are attainable, even with thorough, modern excavation of the site.

Some of the questions they raise in their conclusions, however, can be resolved without resorting to further archaeological study. Where there dogs at the mission? Almost certainly. If the gnaw marks noted by both me and by Lee in her inventory (though not mentioned in her report) are not adequate evidence, there is sufficient documentary evidence from other Tuscarawas Valley Moravian towns.

In this regard, neither Lee nor Goerhing and Snyder cite an important contemporary source of information on lifeways at Schoenbrunn and other Moravian missions in Ohio. Although only a partial index of the records, Flegel (1970) includes significant data on the economy of Schoenbrunn, Gnadenhutten, Salem, and Lichtenau. At Schoenbrunn, for example, he notes (July 9, 1773) "Fishing very successful." (March 19, 1774) "Successful bear hunt." (April 25, 1790) "ten deer for meat hungry New Schb'ers." Of interest, though not bearing directly on the Schoenbrunn diet, (November 18, 1780), "Hunters dismissed with suitable hymn verse" and (June 6, 1774) "Parrots in large numbers."

Comments on Gnadenhutten are more numerous and can be extrapolated to Schoenbrunn and illustrate the emphasis upon hunting and gathering: (July 27, 1773) "Fish dam built." (October 19-21, 1775) "Chestnuts gathered by women" and (July 23-24, 1777) "Blueberries." (July 26-27, 1774) "Six deer, one bear." (March 5, 177) "Raccoon." Notes on hunting are insightful: (November 6, 1774) "Men to be absent about five weeks," (December 29, 1774) "Hunting in deep snow," April 18-25, 1775) "Deer getting scarce around Gnadenhutten, (July 13, 1776) "Large group going out," and (November 15, 1780) "Hunting lasting three to five weeks." It is evident that by this time a substantial portion of the hunting is being done for the fur trade, a fact that needs to be considered in interpreting any faunal analysis: (May 26, 1774, and June 3, 1776) "Trading deer and beaver skins."

One interesting note, though somewhat late to be relevant to Schoenbrunn is the mention at Salem of "black fish (or carps) great success." Unfortunately, there is no known Ohio fish known as "black fish," and the reference remains ambiguous, although it may refer to *Moxostoma duquesni*, known as the black redhorse. Other notes made at Salem include (September 9, 1780) "Roots dug" and (October 2, 1780) "nuts, grapes, and other wild fruits. At Lichtenau (October 7, 1777) were noted "Pigeons in enormous numbers."

Despite inadequacies of the Schoenbrunn faunal sample, it remains likely both the Indian and non-native inhabitants relied heavily upon the native fauna. Leaving aside the

actual study of the Schoenbrunn faunal material, there remains the larger issue of proper curation of archaeological (including faunal) collections. Whenever materials are re-packaged and/or re-labeled, their original provenience should be retained for future study – and detailed analysis of the material should not await 60 or 80 years.

ACKNOWLEDGMENTS

Initial study and subsequent re-examination of the Schoenbrunn faunal material was facilitated by Martha Otto and The Ohio Historical Society. James Morton of Columbus, Ohio, kindly copied several of the photographs originally taken during R. S. Baby's 1950 field work. Mrs. Alice Guilday provided copies of relevant correspondence of the late John Guilday. More recently, access to comparative material was provided by Robert Glotzhober (The Ohio Historical Society), and Dale Gnidovec (Department of Geology, Ohio State University) and Dr. Ted Cavender (Ohio State University, emeritus) kindly examined photographs of some of the fish elements.

REFERENCES CITED

Anonymous
1923 First Settlement of Northwest Territory Is Unearthed Near New Philadelphia by Dr. Mills. Columbus *Ohio State Journal*, July 12, 1923.
1950 Notes and News: Northern Mississippi Area: Ohio. *American Antiquity* 16:185.
1950a Summer Research Program. *Museum Echoes* 23 (6):47-48.
1952 The Indian Houses at Schoenbrunn. *Museum Echoes* 25(4):30-32

Baby, Raymond S.
1950 Museum Notes. Ohio Indian Relic Collectors Society, *Bulletin* 25:31.

Fliegel, Carl John
1970 *Index to the Records of the Moravian Missions.* Research Publications, Woodbridge, Connecticut.

Goehring, Sue, and David Snyder
2003 Schoenbrunn Revisited: Modern Attempts to Interpret a Late Eighteenth Century Experiment. *Ohio Valley Historical Archaeology* 18:24-46.

Heckewelder, John
1820 *A Narrative of the Mission of the United Brethren among the Delaware and Mohegan Indians from Its Commencement in the Year 1740 to the Close of the Year 1808*. M'Carty & Davis, Philadelphia.

Hulbert, Archer Butler, and William Nathaniel Schwarze
1910 David Zeisberger's History of the Northern American Indians. *Ohio Archaeological and Historical Publications* 19:1-189.

Murphy, James L.
1986 Tobacco Pipe Fragments from Schoenbrunn, Tuscarawas County, Ohio. *Historic Clay Tobacco Pipe Studies* 3:65-68.